

Infrared Spectral Observations While Drilling into a Frozen Lunar Simulant

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Abstract:

Past and continuing observations indicate an enrichment of volatile materials in lunar polar regions. While these volatiles may be located near the surface, access to them will likely require subsurface sampling, during which it is desirable to monitor the volatile content. In a simulation of such activities, a multilayer lunar simulant was prepared with differing water content, and placed inside a thermal vacuum chamber at Glenn Research Center (GRC). The soil profile was cooled using liquid nitrogen. In addition to the soil, a drill and infrared (IR) spectrometer (~1600-3400 nm) were also located in the GRC chamber. We report the spectral observations obtained during a sequence where the drill was repeatedly inserted and extracted, to different depths, at the same location. We observe an overall increase in the spectral signature of water ice over the duration of the test. Additionally, we observe variations in the water ice spectral signature as the drill encounters different layers.